

SWEETWATER UNION HIGH SCHOOL DISTRICT

DIVISION OF ADULT EDUCATION

High School Subjects

<u>VI</u> Level	<u>Physical/Earth Science - 1, 2</u> 2015	<u>9043/9044</u> Code
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DURATION: Approximately 60 hours each, extended if necessary, until all required work is satisfactorily completed.

GRADE LEVEL: 9-12/ Adult

PREREQUISITES: None, but a minimum of one year of math is recommended

CREDIT: One semester credit each toward the science requirements for high school graduation may be earned.

PROGRAM DESCRIPTION:

The Physical Earth Science course satisfies the District graduation requirements in the Physical Sciences. Students in the Physical Earth Science course will be expected to master the same state standards as in physics and earth science, but which are taught with less detail. The course will consist of 60% Earth Science standards and 40% Physics standards. A special emphasis will be placed on learning skills such as summarizing, note taking, keeping a notebook, test taking and simple mathematics.

STUDENT LEARNER OUTCOMES:

- Students will establish personal, academic and/or workforce goals and demonstrate progress toward them
- Students will solve problems
- Students will communicate clearly and collaborate with others
- Students will use resources, including technology, to research, organize and communicate information

GOALS: (Course Content Standards)

Through the principles and practice presented in this course, students will

- 1.0 Investigation and Experimentation - Scientific progress is made by asking meaningful questions and conducting careful investigations.
- 2.0 Newton's laws predict the motion of most objects.

- 3.0 The laws of conservation of energy and momentum provide a way to predict and describe the movement of objects.
- 4.0 Energy cannot be created or destroyed although in many processes energy is transferred to the environment as heat.
- 5.0 Waves have characteristic properties that do not depend on the type of wave.
- 6.0 Electric and magnetic phenomena are related and have many practical applications.
- 7.0 Plate tectonics operating over geological time has changed the patterns of land, sea, and mountains on Earth's surface.
- 8.0 Energy enters the Earth system primarily as solar radiation and eventually escapes as heat.
- 9.0 Heating of Earth's surface and atmosphere by the sun drives convection within the atmosphere and oceans, producing wind, weather, and ocean currents, which over the long run produces climate.
- 10.0 Structure and Composition of the Atmosphere- Life has changed Earth's atmosphere, and the changes in the atmosphere affect conditions for life.
- 11.0 Astronomy and planetary exploration reveal the solar system's structure, scale, and change over time.

CONTENT OBJECTIVES:

Students who successfully complete this course will be able to:

- 1.0 With respect to investigation and experimentation,
 - 1.1 Selecting and using appropriate tools and technology (such as computer probes) to perform tests, collect data, analyze relationships, and display data is necessary in science. (CS IAE 1a)
 - 1.2. Recognize the need for controlled tests and identify and communicate reasons for inconsistent results, such as sources of unavoidable experimental error or uncontrolled conditions. (CS IAE 1b,c,j)
 - 1.3. Formulate explanations by using logic and evidence, and recognize the cumulative nature of scientific evidence. (CS IAE 1d,k)
 - 1.4. Distinguish between hypothesis and theory as scientific terms and recognize the usefulness and limitations of models and theories as scientific representations of reality, and recognize that theories have to be changed to fit evidence. (CS IAE 1f,g,n)
- 2.0 With respect to Newton's laws predict the motion of most objects,
 - 2.1. Recognize that when forces are balanced no acceleration occurs, and thus an

- object continues to move at a constant speed or stays at rest (Newton's First Law). (CS Phys. 1b)
- 2.2. Apply the law $F=ma$ to solve motion problems involving constant forces (Newton's Second Law). (CS Phys. 1c)
 - 2.3. Explain how when one object exerts a force on a second object, the second object always exerts a force of equal magnitude and opposite direction. (Newton's Third Law). (CS Phys. 1d)
 - 2.4. Describe the relationship between the universal law of gravitation and the effect of gravity on an object at the surface of the Earth. (CS Phys. 1e)
- 3.0 With respect to the laws of conservation of energy and momentum provide a way to predict and describe the movement of objects,
- 3.1. Calculate kinetic energy using the formula $E=(1/2)mv^2$ (CS Phys. 2a)
 - 3.2. Calculate changes in gravitational potential energy near the Earth using the formula (change in potential energy) $=mgh$ (change in the elevation). (CS Phys. 2b)
- 4.0 With respect to energy cannot be created or destroyed although in many processes energy is transferred to the environment as heat,
- 4.1. Describe how internal energy of an object includes the energy of random motion of the object's atoms and molecules, otherwise known as thermal energy. The greater the temperature of an object, the greater the energy of motion of the atoms and molecules that make up the object. (CS Phys. 3c)
 - 4.2. Recognize that work and heat flow are two forms of energy transfer between systems. (CS Phys. 3a)
 - 4.3. Explain how the work done by a heat engine that is working in a cycle is the difference between the heat flow into the engine at high temperature and the heat flow out at a lower temperature (First Law of Thermodynamics) and that this is an example of the law of conservation of energy. (CS Phys. 3b)
 - 4.4. Demonstrate how most processes tend to decrease the order of a system over time (entropy), and energy levels are eventually distributed uniformly--2nd Law of Thermodynamics. (CS Phys. 3d)
- 5.0 With respect to waves have characteristic properties that do not depend on the type of wave,
- 5.1. Identify transverse and longitudinal waves in mechanical media such as springs, ropes, and the Earth (seismic waves), and discuss how sound is a longitudinal wave whose speed depends on the properties of the medium in which it propagates. (CS Phys. 4b and 4d)
 - 5.2. Know that radio waves, light and X-rays are different wavelength bands in the spectrum of electromagnetic waves whose speed in vacuum is approximately 3.0×10^8 m/s (186,000 miles/second). (CS Phys. 4e)
- 6.0 With respect to electric and magnetic phenomena are related and have many practical

- applications,
- 6.1. Predict the voltage or current in simple direct current electric circuits constructed from batteries, wires, resistors and capacitors using Ohm's Law. (CS Phys. 5e)
 - 6.2. Describe how magnetic materials and electric currents (moving electric charges) are sources of magnetic fields and experience forces due to magnetic fields of other sources. (CS Phys. 5f)
 - 6.3. Investigate why magnetic fields produce electric fields, thereby inducing currents in nearby conductor, and investigate how to determine the direction of a magnetic field produced by a current flowing in a straight wire or in a coil. (CS Phys. 5h, 5g)
 - 6.4. Recognize the properties of transistors and their role in electric circuits. (CS Phys. 5d)
- 7.0 With respect to plate tectonics operating over geological time has changed the patterns of land, sea, and mountains on Earth's surface,
- 7.1. Recognize how features of the ocean floor (magnetic patterns, age, and sea-floor topography) provide evidence of plate tectonics (CS ES 3a).
 - 7.2. Distinguish the principal structures that form at the three different kinds of plate boundaries, including the two kinds of volcanoes. (CS ES 3b)
 - 7.3. Explain the properties of rocks based on the physical and chemical conditions in which they formed, including plate tectonics processes. (CS ES 3c)
 - 7.4. Explain how and why earthquakes occur (especially California) and the scales used to measure their intensity and magnitude. (CS ES 3d)
 - 7.5. Distinguish between the two types of volcanoes: one kind with violent eruptions producing steep slopes and the other kind with voluminous lava flows producing gentle slopes.
- 8.0 With respect to energy enters the Earth system primarily as solar radiation and eventually escapes as heat,
- 8.1. Compare the relative amount of incoming solar energy in terms of reflection, absorption, and photosynthesis compared with Earth's internal energy and the energy used by society. (CS ES 4a)
 - 8.2. Discuss the different atmospheric gases that absorb the Earth's thermal radiation and the mechanism and significance of the greenhouse effect. (CS ES 4c)
- 9.0 With respect to heating of Earth's surface and atmosphere by the sun drives convection within the atmosphere and oceans, producing wind, weather, and ocean currents, which over the long run produces climate,
- 9.1. Explain how differential heating of Earth results in circulation patterns in the atmosphere and oceans that globally distribute the heat, and how the rotation of Earth relates to the circular motions of ocean currents and air in pressure centers. (CS ES 5a and 5b)
 - 9.2. Identify how the properties of ocean water, such as temperature and salinity, can be used to explain the layered structure of the oceans, the generation of horizontal and vertical ocean currents, and the geographic distribution of marine organisms. (CS ES 5d)

- 9.3. Recognize how rain forests and deserts on Earth are distributed in bands at specific latitudes (CS ES 5e).
 - 9.4. Describe the effects of climate on latitude, elevation, topography, and proximity to large bodies of water and cold or warm ocean currents. (CS ES 6b)
 - 9.5. Analyze how Earth's climate has changed over time, corresponding to changes in Earth's geography, atmospheric composition, and other factors such as solar radiation and plate movement. (CS ES 6c)
 - 9.6. Understand the importance of water to society, the origins of California's fresh water, and the relationship between supply and demand. (CS ES 9c)
- 10.0 With respect to structure and composition of the atmosphere,
- 10.1. Illustrate the thermal structure and chemical composition of the atmosphere, including the variations of carbon dioxide concentration, and the origin of atmospheric oxygen. (CS ES 8a and 8b)
 - 10.2. Describe the location of the ozone layer in the upper atmosphere, its role in absorbing ultraviolet radiation, and the way in which this layer varies both naturally and in response to human activities. (CS ES 8c)
- 11.0 With respect to astronomy and planetary exploration reveal the solar system's structure, scale, and change over time,
- 11.1. Compare and contrast the differences and similarities among the sun, the terrestrial planets, and the gas planets that may have been established during the formation of the solar system. (CS ES 1a)
 - 11.2. Describe evidence from Earth and moon rocks that indicates the solar system was formed from a nebular cloud of dust and gas approximately 4.6 billion years ago. (CS ES. 1b)
 - 11.3. Know that the Sun is a typical star and is powered by nuclear reactions, primarily the fusion of hydrogen to form helium, and that all elements with an atomic number greater than lithium have been formed by nuclear fusion in stars. (CS ES 1e, 2c)
 - 11.4. Explain that stars differ in their life cycles and that visual, radio, and X-ray telescopes may be used to collect data that reveal those differences. (CS ES 2d)
 - 11.5. Describe how the solar system is located on the outer edge of the disc-shaped Milky Way Galaxy, and that galaxies are made up of billions of stars. (CS ES 2a, 2b)

INSTRUCTIONAL STRATEGIES AND TIMES:

Individual Work on assignments, including projects, research and experiments or Teacher lecture and demonstration	50%
Teacher/student evaluation of student practice	15%

Use of media and technology	20%
Assessment	15%

EVALUATION:

1. Satisfactory completion of written assignments as evaluated by the instructor.
2. Satisfactory completion of teacher-made and/or standardized test as evaluated by the instructor.
3. Satisfactory progress and participation in classroom activities as evaluated by the instructor.

CONDITIONS FOR REPETITION:

Students who have failed to meet the objectives because of insufficient attendance or inability to master content may repeat the course.

Approved:
BOARD OF TRUSTEES
March 21, 1974

Revised:
July 12, 1983
August 27, 1987
December 16, 1996
June 16, 2003
August 17, 2009
April 19, 2010
May 26, 2015
October 26, 2015